We claim:

1. A thruster for a vehicle comprising:

a source of propellant;

a source of microwave energy at or above approximately 35 GHz;

a heat exchanger for receiving energy from the source of microwave energy and coupled to the source of propellant to heat the propellant to create an expanding medium; and

a thrust converter coupled to the heat exchanger to generate thrust from the expanding medium.

2. The thruster of claim 1 where the source of propellant comprises a source of hydrogen gas under pressure.

3. The thruster of claim 1 where the source of propellant comprises ambient atmosphere.

4. The thruster of claim 1 where source of microwave energy is at or above approximately 140 GHz.

5. The thruster of claim 1 where the source of propellant comprises ambient atmosphere and a combustible material, which is combusted with the ambient atmosphere to release additional energy added to that from the source of microwave energy and delivered to the thrust converter.

6. The thruster of claim 1 where the heat exchanger comprises a microwave absorber thermally coupled with the propellant supplied from the source of propellant and electromagnetically coupled to the source of microwave energy.

7. The thruster of claim 4 where the microwave absorber comprises a lossy dielectric block having a plurality of propellant channels defined therethrough.

8. The thruster of claim 4 where the microwave absorber comprises a susceptor.

9. The thruster of claim 1 where the susceptor comprises a sheet having a layered structure in which a plurality of propellant channels are defined and in which a susceptor is embedded.

10. The thruster of claim 9 where the layered structure comprises a susceptor layer disposed about the plurality of propellant channels and in intimate heat exchanging relationship with propellant flowing through the plurality of propellant channels, a dielectric layer disposed on each side of the susceptor layer, and a reflector layer

adjacent the dielectric layer on the side opposite the dielectric layer providing a microwave exposure surface, the dielectric, susceptor and reflector layers chosen in material properties and dimensions to maximize power absorption fraction of the susceptor layer.

11. A method of propelling a vehicle comprising:

providing propellant in the vehicle;

providing microwave energy broadcast to the vehicle at or above 35 GHz;

absorbing the microwave energy in a body of a microwave absorbing heat exchanger in the vehicle;

transferring the absorbed energy in the body of the heat exchanger to the propellant; and

converting the energized propellant into thrust for the vehicle.

12. The method of claim 11 where providing propellant comprises providing hydrogen.

13. The method of claim 11 where providing propellant comprises providing ambient atmosphere.

14. The method of claim 12 where providing microwave energy provides the microwave energy at or above 140 GHz.

15. The method of claim 11 where providing propellant comprises providing ambient atmosphere and a combustible material, combusting the combustible material with the ambient atmosphere to release additional energy added to that from the source of microwave energy and converting the additional energy to thrust.

16. The method of claim 11 where absorbing the microwave energy comprises electromagnetically coupling a heat exchanger with a source of microwave energy and where transferring the absorbed energy to the propellant comprises transferring the absorbed microwave energy to the propellant supplied by means of a flow heat exchanger.

17. The method of claim 14 where absorbing the microwave energy comprises absorbing the microwave energy in a lossy dielectric structure.

18. The method of claim 14 where absorbing the microwave energy comprises absorbing the microwave energy in a susceptor.

19. The method of claim 11 where absorbing the microwave energy comprises absorbing the energy by means of a sheet having a layered structure in which a plurality of propellant channels are defined and in which a susceptor is embedded.

20. The method of claim 11 where absorbing the energy by means of a sheet having a layered structure comprises exposing a first dielectric layer to microwave energy, absorbing the energy by means of a first and second susceptor layer disposed beneath the first dielectric layer, exchanging heat with propellant flowing through the plurality of propellant channels in intimate contact with the first and second susceptor layers, supporting the second susceptor layer with a second a dielectric layer, backing the second susceptor layer with a reflector layer, and choosing the dielectric, susceptor and reflector layers in terms of both material properties and dimensions to maximize power absorption fraction of the susceptor layer.

21. The method of claim 11 where a microwave thruster forms an undersurface of the vehicle, and where providing and absorbing the microwave energy comprises intercepting microwaves from a ground-based source or plurality of sources with the undersurface of the craft such that sufficient energy necessary to achieve a given trajectory is received at every point along the trajectory.

22. The thruster of claim 1 further comprising an aeroshell for the vehicle and where the thruster forms part of the aeroshell.

23. The thruster of claim 22 where the microwave thruster acts as part of an atmospheric re-entry heat shield.

24. The thruster of claim 23 further comprising a source of cooling fluid coupled to the thruster and where a fluid is selectively passed through the heat exchanger to cool the overall structure.

25. The thruster of claim 8 where the susceptor is comprised of at least one layer having an electroplated surface.

26. The thruster of claim 25 where the susceptor is comprised of a plurality of susceptor layers, which are clad with one or more dielectric and reflecting layers, and where at least one of the susceptor, dielectric and reflecting layers are vapor deposited.

27. The method of claim 11 where providing the microwave energy comprises providing microwave energy at a source frequency, and further comprises tuning the source frequency to match maximum absorption to help the absorbing exchanger to heat up.

28. The method of claim 27 where tuning the source frequency comprises continuously sweeping a range of frequencies to promote uniformity of heating when the absorbing heat exchanger is operating in or close to a thermal steady state.

29. The thruster of claim 7 where the thrust converter comprises a Laval nozzle.

30. The thruster of claim 8 where the thrust converter comprises a Plug nozzle.

31. The thruster of claim 1 where the source of propellant is a source of hydrogen.

32. The thruster of claim 1 where the source of propellant is a source of ammonia.

33. The method of claim 11 further comprising heating dummy warheads after separation from a delivery vehicle by means of the broadcast microwave energy and sensing the dummy warheads by infrared signatures thereof created by the differential heating between dummy and real warheads.